

CLAIMS

1. A buffer memory address translation device, characterized in that the buffer memory address translation device comprises:

analysis means of analyzing a synchronization pattern included in data read from an optical disk medium and positional data allowing a data position to be recognized included in the data read from said optical disk medium; and

address generation means of generating an address for storage into a buffer memory based on a result of said analysis, and

said read data is stored in a region corresponding to said generated address in said buffer memory.

2. The buffer memory address translation device according to claim 1, characterized in that said positional data is sector address information.

3. The buffer memory address translation device according to claim 1, characterized in that said positional data is a frame synchronization code.

4. The buffer memory address translation device according to claim 2, characterized in that said analysis means comprises:

sector address information readout means of reading sector address information included in the data read from said optical disk medium;

sector address information reliability determination means of determining the reliability of said read sector address information;

sector address information interpolation means of interpolating said sector address information for a sector the sector address information for which is not determined to be reliable; and

sector address information selection means of selecting said sector address information read by said sector address information readout means or said sector address information interpolated by said sector address information interpolation means according to a predetermined criterion, and

said address generation means generates an address for storage into said buffer memory according to said selected sector address information.

5. The buffer memory address translation device according to claim 4, characterized in that said read sector address information has an error detection code added thereto, and

said determination of reliability is accomplished by using said added error detection code to detect an error in said read sector address information.

6. The buffer memory address translation device according to claim 4, characterized in that said determination of reliability is accomplished by determining continuity between said read sector address information and sector address information previously read.

7. The buffer memory address translation device according to claim 4, characterized in that said predetermined criterion is a criterion of reliability required by external control means, and

said sector address information selection means selects one of them by analyzing the criterion of reliability required by said external control means and said determination result of said sector address information reliability determination means.

8. A buffer memory address translation device, characterized in that the buffer memory address translation device comprises:

readout means of reading a frame synchronization code added to data read from an optical disk medium;

storage means of encoding said read frame synchronization codes and sequentially storing the same therein;

frame position digitization means of digitizing a position of a frame based on an arrangement of said codes stored in said storage means;

continuity determination means of determining whether said digitized frame positions are continuous;

counter means of counting the number of the digitized frame positions that are determined to be continuous;

frame position determination means of comparing the number of the continuous frame positions counted by said counter means with a threshold that can be set by an external control means and, if the result of said comparison satisfies a predetermined condition, determining that the value digitized by said frame position digitization means is a frame position;

frame position interpolation means of, if the condition is not satisfied in said frame position determination means, carrying out interpolation based on a previous frame position for which the condition is satisfied to find a frame position; and

address generation means of generating an address for storage into a buffer memory based on said frame position found by said frame position interpolation means or the

frame position determined by said frame position determination means, and

said read data is stored in a region corresponding to said generated address in said buffer memory.

9. A sector address information reliability determination device, characterized in that the sector address information reliability determination device comprises:

error detection means of detecting an error of sector address information included in data read from an optical disk medium and having an error detection code added thereto;

sector address information continuity determination means of comparing said sector address information currently extracted from said read data with said sector address information previously extracted to determine the continuity of said sector address information; and

reliability determination means of determining the reliability of said sector address information based on the result of the error detection for said sector address information and the result of the continuity determination for said sector address information with reference to a predetermined condition set by said external control means.

10. In readout from a rewritable optical disk medium storing sector physical address information that is a physical address of said sector besides sector logical address information included in data, a defective sector determination device, characterized in that the defective sector determination device comprises:

continuity detection means of detecting a position where a difference occurs between the continuity of said sector physical address information and the continuity of said sector logical address information;

defective sector detection means of finding a defective sector using said detected difference; and

informing means of informing an external control means of said detected defective sector.

11. The defective sector determination device according to claim 10, characterized in that said defective sector detection means detects the number of said defective sectors and the sector physical address information of a leading one of said defective sectors, and

said informing means informs of said number of defective sectors and said sector physical address information of a leading one of said defective sectors.

- 91 -

12. The defective sector determination device according to claim 10, characterized in that said continuity determination means comprises:

sector physical address information readout means of reading said sector physical address information;

sector physical address information error detection means of detecting an error of said read sector physical address information; and

sector physical address information comparison means of comparing, of the sector physical address information for which an error is not detected by said sector physical address information error detection means, current sector physical address information with the previous sector physical address information, and

said continuity determination means of, if said sector physical address information error detection means detects no error in said read sector physical address information, determining the continuity between said read sector physical address information and said previous sector physical address information based on the result of said comparison.

13. The defective sector determination device according to claim 10, characterized in that said continuity determination means comprises:

- 92 -

sector logical address information readout means of reading said sector logical address information;

sector logical address information error detection means of detecting an error of said read sector logical address information; and

sector logical address information comparison means of comparing, of the sector logical address information for which an error is not detected by said sector logical address information error detection means, current sector logical address information with the previous sector logical address information, and

said continuity determination means of, if said sector logical address information error detection means detects no error in said read sector logical address information, determining the continuity between said read sector logical address information and said previous sector logical address information based on the result of said comparison.

14. The defective sector determination device according to claim 10, characterized in that said position where a difference occurs is a position where there are one or more sectors for which the sector physical address information is determined to be continuous between two continuous sectors corresponding to the sector address

information for which said sector address information is determined to be continuous.

15. The defective sector determination device according to claim 11, characterized in that said defective sector detection means regards the sector physical address information of the sector for which said sector logical address information is not continuous as the sector physical address information of said leading one of the defective sectors.

16. The defective sector determination device according to claim 11, characterized in that said defective sector detection means detects the number of sectors for which said sector physical address information is determined to be continuous and that exist between the two sectors corresponding to the sector logical address information determined to be continuous, and regards said number of detected sectors as said number of defective sectors.

17. An ECC block synchronization detection device, characterized in that the ECC block synchronization device comprises:

error detection means of detecting an error of sector address information that is read from an optical disk medium in which an error correcting code is added thereto across n sectors ($n = \text{integer}$) and the error correcting code is accommodated in the continuous n sectors;

sector address information division means of, if said error detection means detects no error in said read sector address information, finding the quotient of said read sector address information divided by the number of sectors constituting an ECC block; and

ECC block detection means of, if said sector address information error detection means detects no error in said read sector address information, comparing said quotient of said read sector address information with the previously found quotient and determining that the ECC block synchronization is detected if the comparison does not result in a match.

18. An optical disk drive, characterized in that the optical disk drive comprises:

data readout means of reading data from an optical disk medium; and

a controller that, in response to a request from an external device, controls said data readout means to temporarily store said read data into a buffer memory and then transfers the same to said external device, and

said controller has the buffer address translation device, sector address reliability determination device, defective sector determination device, or ECC block synchronization detection device according to any of claims 1 to 17 implemented therein.

19. A medium capable of being processed by a computer, characterized in that the medium stores a program for making the computer serve as whole or part of the analysis means of analyzing a synchronization pattern included in data read from an optical disk medium and positional data allowing a data position to be recognized included in the data read from said optical disk medium, and the address generation means of generating an address for storage into a buffer memory based on a result of said analysis of the buffer memory address translation device according to claim 1.

20. A medium capable of being processed by a computer, characterized in that the medium stores a program for making the computer serve as whole or part of the readout means of reading a frame synchronization code added to data read from an optical disk medium, the storage means of encoding said read frame synchronization codes and sequentially storing the same therein,

the frame position digitization means of digitizing a position of a frame based on an arrangement of said codes stored in said storage means,

the continuity determination means of determining whether said digitized frame positions are continuous,

the counter means of counting the number of the digitized frame positions that are determined to be continuous,

the frame position determination means of comparing the number of the continuous frame positions counted by said counter means with a threshold that can be set by an external control means and, if the result of said comparison satisfies a predetermined condition, determining that the value digitized by said frame position digitization means is a frame position,

the frame position interpolation means of, if the condition is not satisfied in said frame position determination means, carrying out interpolation based on a previous frame position for which the condition is satisfied to find a frame position, and

the address generation means of generating an address for storage into a buffer memory based on said frame position found by said frame position interpolation means or the frame position determined by said frame position determination means of the buffer memory address translation device according to claim 8.

21. A medium capable of being processed by a computer, characterized in that the medium stores a program for making the computer serve as whole or part of the error detection means of detecting an error of sector address information

- 97 -

included in data read from an optical disk medium and having an error detection code added thereto,

the sector address information continuity determination means of comparing said sector address information currently extracted from said read data with said sector address information previously extracted to determine the continuity of said sector address information, and

the reliability determination means of determining the reliability of said sector address information based on the result of the error detection for said sector address information and the result of the continuity determination for said sector address information with reference to a predetermined condition set by said external control means of the sector address information reliability determination device according to claim 9.

22. A medium capable of being processed by a computer, characterized in that the medium stores a program for making the computer serve as whole or part of the continuity detection means of detecting a position where a difference occurs between the continuity of said sector physical address information and the continuity of said sector logical address information,

the defective sector detection means of finding a defective sector using said detected difference, and

the informing means of informing an external control means of said detected defective sector of the defective sector determination device according to claim 10 in readout from a rewritable optical disk medium storing said sector physical address information that is a physical address of said sector besides said sector logical address information included in data.

23. A medium capable of being processed by a computer, characterized in that the medium storing a program for making the computer serve as whole or part of the error detection means of detecting an error of sector address information that is read from an optical disk medium and has an error correcting code added thereto across n sectors ($n = \text{integer}$) and the error correcting code accommodated in the continuous n sectors,

the sector address information division means of, if said error detection means detects no error in said read sector address information, finding the quotient of said read sector address information divided by the number of sectors constituting an ECC block, and

the ECC block detection means of, if said sector address information error detection means detects no error in said read sector address information, comparing said quotient of said read sector address information with the previously found quotient and determining that the ECC

block synchronization is detected if the comparison does not result in a match of the ECC block synchronization detection device according to claim 17.

24. A program for making the computer serve as whole or part of the analysis means of analyzing a synchronization pattern included in data read from an optical disk medium and positional data allowing a data position to be recognized included in the data read from said optical disk medium, and

the address generation means of generating an address for storage into a buffer memory based on a result of said analysis of the buffer memory address translation device according to claim 1.

25. A program for making the computer serve as whole or part of the readout means of reading a frame synchronization code added to data read from an optical disk medium, the storage means of encoding said read frame synchronization codes and sequentially storing the same therein,

the frame position digitization means of digitizing a position of a frame based on an arrangement of said codes stored in said storage means,

the continuity determination means of determining whether said digitized frame positions are continuous,

- 100 -

the counter means of counting the number of the digitized frame positions that are determined to be continuous,

the frame position determination means of comparing the number of the continuous frame positions counted by said counter means with a threshold that can be set by an external control means and, if the result of said comparison satisfies a predetermined condition, determining that the value digitized by said frame position digitization means is a frame position,

the frame position interpolation means of, if the condition is not satisfied in said frame position determination means, carrying out interpolation based on a previous frame position for which the condition is satisfied to find a frame position, and

the address generation means of generating an address for storage into a buffer memory based on said frame position found by said frame position interpolation means or the frame position determined by said frame position determination means of the buffer memory address translation device according to claim 8.

26. A program for making the computer serve as whole or part of the error detection means of detecting an error of sector address information included in data read from

an optical disk medium and having an error detection code added thereto,

the sector address information continuity determination means of comparing said sector address information currently extracted from said read data with said sector address information previously extracted to determine the continuity of said sector address information, and

the reliability determination means of determining the reliability of said sector address information based on the result of the error detection for said sector address information and the result of the continuity determination for said sector address information with reference to a predetermined condition set by said external control means of the sector address information reliability determination device according to claim 9.

27. A program for making the computer serve as whole or part of the continuity detection means of detecting a position where a difference occurs between the continuity of said sector physical address information and the continuity of said sector logical address information,

the defective sector detection means of finding a defective sector using said detected difference, and

the informing means of informing an external control means of said detected defective sector of the defective

- 102 -

sector determination device according to claim 10 in readout from a rewritable optical disk medium storing said sector physical address information that is a physical address of said sector besides said sector logical address information included in data.

28. A program for making the computer serve as whole or part of the error detection means of detecting an error of sector address information that is read from an optical disk medium and has an error correcting code added thereto across n sectors ($n = \text{integer}$) and the error correcting code accommodated in the continuous n sectors,

the sector address information division means of, if said error detection means detects no error in said read sector address information, finding the quotient of said read sector address information divided by the number of sectors constituting an ECC block, and

the ECC block detection means of, if said sector address information error detection means detects no error in said read sector address information, comparing said quotient of said read sector address information with the previously found quotient and determining that the ECC block synchronization is detected if the comparison does not result in a match of the ECC block synchronization detection device according to claim 17.